Instructions for Electronic Forms, pg 1

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1

Revised Oct 2013

Intro	Commercial Provision Chapters 1 - 5 of the 2012 Washington State Energy Code apply to all commercial occupancies, R-2 and R-3 occupancies greater than 3 stories above grade, and R-1 occupancy (all building heights). This file, ENV12-v3.XLSM, has electronic compliance forms for envelope provisions as defined in Sections C101, C303, C402 and Appendix A for Climate Zones 4c and 5b. There are two companion files: LTG12-v3.XLSM (Section C405 lighting, motor, and transformer requirements), and MECH12-v3.XLSM (Section C403 mechanical systems requirements).
Energy Code	This form is a compliance aid and is not a substitute for the full energy code text or specific jurisdiction compliance requirements. Users should refer to the code text and contact the local jurisdiction for complete information. The full 2012 WSEC code text is available for download from the NEEC website: http:/www.neec.net/energy-codes
Training	Refer to the NEEC website for instruction on how to complete all of the 2012 WSEC Compliance Forms.
Start-up	Select this file from the NEEC website to download to your computer. When opening the file be sure to **Enable Macros**.
Overview	This file is an Excel workbook that contains multiple compliance forms and resources in Excel worksheets. Each worksheet is indicated by a tab at the bottom of the screen. You may visit each worksheet by selecting it's tab. Most calculations are automated. Cells that display informational text and the results of calculations are write-protected and cannot be edited.
Save Files	This file is saved in the same manner as any standard Excel file.
Getting Around	Some forms have two pages. Both pages are available on screen when you select the tab for a form (worksheet). Use the scroll bars to find the second page located below the first page.
Input Cells	All general project information and the date are entered once on ENV-SUM. This information is automatically replicated on all other ENV forms. The ENV-SUM form accompanies all other ENV forms. Only input cells are accessible. If you try to edit a write-protected cell an error message will appear requesting a password. A password IS NOT required to complete these forms. You may use the TAB key to move to the next input cell. If the TAB doesn't take you where you want to go, use your mouse to move around the form. Avoid excessively long text strings when entering information. In some cases, text that extends beyond the available space will not be visible. In most cases the text will wrap within the cell. This may force part of the form onto a new page. To enter the date, use this format: mm/dd/yyyy. For example, you would enter 7/1/2013 or 12/21/2014. Check boxes can be checked or unchecked by clicking in the box with your mouse. Radio buttons (circles) allow only one in a set to be selected. Drop-down lists have an arrow at the right side of the cell. Click on the arrow with your mouse and select the appropriate option. Use the delete button on your computer to clear a drop-down entry. When a form has a space for notes or explanation, click anywhere in the space to edit.
Personalizing	You can personalize the forms with your company name, address, phone, or any other information. This is done by editing the header or footer in Excel.
Adding Lines and Removing	Many tables, such as for listing envelope assembly types, have a certain number of lines available for entering data. You may need more lines to enter all your information. Where this feature is available, you can add additional lines to the table by selecting the "+" button on the right hand side of the table with your mouse. If you can't see the "+" button, scroll to the right or increase the View Zoom setting for the worksheet. To remove lines that you have added, select the "-" button with your mouse. You cannot remove lines that were not added; an error message will appear if you try. If you add additional lines with this method, the pagination may be affected forcing the forms to carry additional lines over to other pages. Be sure to submit all pages to the plans examiner.
Compliance Path	You must select a **Compliance Path** on ENV-SUM (line 12) to activate the correct input method for Window-to-Wall and Skylight-to-Roof ratios.
Occupancy Group	You must select an **Occupancy Group** on ENV-SUM (line 14) for this workbook to display the correct code requirements and automatically calculate component performance target UA values.

Instructions for Electronic Forms, pg 2

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1

Revised Oct 2013

Fenestration Area	For projects complying via the Prescriptive Path, enter the vertical fenestration area, gross wall area (includes vertical fenestration, doors, etc), skylight area and gross roof area (includes skylights, mechanical equipment curbs, etc) directly into the **Vertical Fenestration and Skylight Area Calculation** input cells on the ENV-SUM form. The form will calculate the Window-to-Wall and Skylight-to-Roof ratios. For projects complying via the Component Performance Path, the Vertical Fenestration and Skylight Area inputs in the ENV-SUM form are write protected. Enter all applicable envelope information in the ENV-UA form. The resulting Window-to-Wall and Skylight-to-Roof ratios will auto fill into the ENV-SUM form from the ENV-UA form.
Vertical Fenestration Alternates	The prescriptive vertical fenestration target area is 30%. This target increases to 40% if the project complies with the requirements of either C402.3.1.1 50% floor area within the daylight zone, or C402.3.1.3 high performance vertical fenestration. If the project is eligible for one of these alternates, select the corresponding button on Line 24 of the ENV-SUM form. This will re-calculate the prescriptive target area in the ENV-SUM and ENV-UA forms based on 40%.
Target Area Adjustment	Target Area Adjustment is required if the project exceeds the prescriptive target area for vertical fenestration or skylights. Adjusted target areas are automatically calculated in the ENV-UA form using envelope assembly areas you enter for your project. Adjusted target areas will appear in the Target UA column in the ENV-UA form. Refer to Target Area Adjustment worksheet for the supporting calculations.
Printing	The forms should print on any printer supported by your operating system. You will need to have the following TrueType fonts installed under Windows: Arial, Times New Roman, Courier New and Wingdings. These are all standard Windows fonts. If you are losing form details when printing, you may have a shortage of printer memory. Try printing problem pages individually. By default, only the active worksheet is printed. To print more than one worksheet at a time, open your print set-up menu and select either the page range you wish to print or Entire Workbook. Forms (worksheets) in a workbook may not be deleted because the file is locked.
Blank Forms	To print blank forms to fill out by hand, delete all of the heading information at the beginning of ENV-SUM and select the desired **Occupancy Group**. For each radio button group there is a button labeled "Clear." Clicking this button will clear the other buttons so that they will print as empty circles. The "Clear" button will not print.

End of Instructions for Electronic Forms

Envelope Summary — ENV-SUM

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised Oct 2013

Project Info

***Compliance forms do not require a password to use**. Instructional and calculating cells are write-protected.*

Project Address	`1 - This address line will copy onto other forms`
Applicant Name:	
Applicant Address:	
Applicant Phone:	

Date

For Building Department Use

Project Description

☐ New Building ☐ Addition ☐ Alteration ☐ Change of Occupancy/Conditioning

Compliance Path

Selection required to enable forms.

◯ Prescriptive ◯ Component Performance ◯ Total Building Performance

Occupancy Group

Selection required to enable forms.

◯ Commercial ◯ Group R - R2 & R3 over 3 stories and all R1

Vertical Fenestration and Skylight Area Calculation

If complying via the Prescriptive path, enter values for vertical fenestration, skylights, gross walls and roof on this ENV-SUM worksheet. If complying via the Component Performance path, enter these values in the ENV-UA worksheet. These values auto-fill from ENV-UA and are write-protected on ENV-SUM.

Total Vertical Fenestration (rough opening)	divided by	Gross Exterior Above Grade Wall Area	times 100 equals	% Vertical Fenestration
	÷		X 100 =	

Total Skylight	divided by	Gross Exterior Roof Area	times 100 equals	% Skylight
	÷		X 100 =	

Fenestration Area Compliance

Vertical Fenestration Area

Skylight Area

Vertical Fenestration Alternates

◯ 50% or more of the floor area is within a daylight zone per C402.3.1.1

◯ High Performance Fenestration U-factors and SHGC per C402.3.1.3

Single Story Spaces Requiring Skylights

Compliance Method

☐ Skylight area 3% or greater, VT-0.40 or greater

☐ Skylight effective aperture 1% or greater, provide calculation

☐ Space eligible for exception _____

Requires a minimum of 50% of floor area to be within a skylight daylight zone for specific space types. Refer to C402.3.2 for requirements.

Semi-Heated Spaces

☐ Project has semi-heated spaces as defined per C402.1.4

☐ Applying wall exception to semi-heated spaces

1. *Semi-heated spaces may comply under Prescriptive or Component Performance compliance path.*
2. *Semi-heated spaces shall be documented separately from other conditioned spaces – provide separate compliance forms for each conditioned space type.*
3. *Envelope elements separating semi-heated from other conditioned spaces shall comply with exterior thermal envelope requirements.*

Refrigerated Spaces

☐ Walk-in Cooler ☐ Walk-in Freezer

☐ Refrigerated Warehouse Cooler ☐ Refrigerated Warehouse Freezer

Refrigerated spaces shall comply under the Prescriptive Path only. Compliance documentation for these areas may be combined with non-refrigerated areas in the ENV-PRESCRIPTIVE form. Refer to C402.5 and C402.6 for requirements.

Mixed Occupancy and/or Space Conditioning

Project includes more than one occupancy type and/or level of space conditioning. Multiple compliance forms may be required. Select all that apply to scope of project:

☐ Commercial ☐ R2 & R3 over 3 stories and all R1 ☐ Refrigerated Space

☐ Fully Conditioned ☐ Semi-Heated ☐ Low Energy*

☐ R2 & R3 - 3 stories or less

**Low energy areas are exempt from all thermal envelope provisions and compliance forms for these areas are not required. Refer to C101.5.2 for exemption.*

Envelope Requirements Summary, pg 1 — ENV-REQ

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R

Revised Oct 2013

Minimum Requirements for Prescriptive Compliance

This table summarizes prescriptive compliance requirements for opaque elements and fenestration. ***Refer to Tables C402.1.2, C402.2 and C402.3 in the 2012 WSEC for important footnotes that apply to these tables.*** *Refer to Section C402 for all applicable requirements that apply for each envelope element type and applicable exceptions.*

Prescriptive Path	Table C402.2 Notes 1,7 Insulation Minimum R-Value		Table C402.1.2 Notes 1,2 Assembly Maximum U-factor	
Occupancy Group	**All Other**	**Group R**	**All Other**	**Group R**
Opaque Elements				
Roofs				
Insulation Entirely above Deck	R-30 c.i.	R-38 c.i.	U-0.034	U-0.031
Metal Building (with R-3.5 thermal blocks) Note 3	R-25 + R-11 Ls	R-25 + R-11 Ls	U-0.031	U-0.031
Attic and Other	R-49	R-49	U-0.021	U-0.021
Walls, Above-grade				
Mass	R-9.5 c.i.	R-13.3 c.i.	U-0.104 Note 6	U-0.078
Metal Building	R-13 + R-13 c.i.	R-13 + R-13 c.i.	U-0.052	U-0.052
Steel Framed	R-13 + R-10c.i.	R-19 + R-8.5 c.i.	U-0.055	U-0.055
Wood Framed and Other	R-21 int	R-21 int	U-0.054	U-0.054
Below Grade Wall Note 4	Same as above grade		Same as above grade	
Floors				
Mass	R-30 c.i.	R-30 c.i.	U-0.031	U-0.031
Steel Joist	R-38 + R-10 c.i.	R-38 + R-10 c.i.	U-0.029	U-0.029
Wood Framed and Other	R-30	R-30	U-0.029	U-0.029
Slab-On-Grade Floors				
Unheated	R-10 for 24 in. (from top of slab)		F-0.54	F-0.54
Heated Note 5	R-10 perimeter & under entire slab		F-0.55	F-0.55
Opaque Doors				
Swinging	No R-Value for prescriptive compliance.		U-0.37	U-0.37
Roll-up or sliding	R-4.75	R-4.75	No U-Value for prescriptive compliance.	
	Table C402.3 - 0-30% of wall area, or 30%-40% per Section C402.3.1.1 DLZ		***Section C402.3.1.3 High Performance Fenestration Option - 0-40% of wall area***	
Fenestration	**Assembly Maximum U-factor Notes 1,2**			
Vertical Fenestration				
Nonmetal framing	U-0.30	U-0.30	U-0.28	U-0.28
Metal framing (fixed)	U-0.38	U-0.38	U-0.34	U-0.34
Metal framing (operable)	U-0.40	U-0.40	U-0.36	U-0.36
Entrance doors	U-0.60	U-0.60	U-0.60	U-0.60
Skylights				
Skylights	U-0.50	U-0.50	U-0.50	U-0.50
Fenestration	**Assembly Maximum SHGC Factor**			
Vertical Fenestration	PF < 0.2: all orientations - SHGC-0.40 0.2 ≤ PF < 0.5: north - SHGC-0.44; all other - SHGC-0.48 PF ≥ 0.5: north - SHGC-0.48; all other - SHGC-0.64		PF < 0.2: all orientations - SHGC-0.35 0.2 ≤ PF < 0.5: north - SHGC-0.385; all other - SHGC-0.42 PF ≥ 0.5: north - SHGC-0.42; all other - SHGC-0.56	
Skylights	SHGC-0.35		SHGC-0.35	
Refrigerated Spaces Insulation	**Insulation Minimum R-Value Table C402.5 and C402.6**		**Assembly Maximum U-factor**	
Freezers - Walk-in and Warehouse				
Roof / Ceiling	R-32		No U-Value for prescriptive compliance	
Wall	R-32			
Door	R-32			
Door - transparent reach-in	triple-pane, heat-reflective treated or gas			
Floor	R-28			
Coolers - Walk-in and Warehouse				
Roof / Ceiling	R-25		No U-Value for prescriptive compliance	
Wall	R-25			
Door	R-25			
Door - transparent reach-in	double-pane, heat-reflective treated & gas fill, or comply with freezer door req.			
Floor	No Requirement			

Envelope Requirements Summary, pg 2 ENV-REQ

Definitions:

Ls = Liner system -- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins. Refer to Section A102.2.5.4.
c.i. = Continuous insulation -- Insulation that is continuous across all structural members without thermal bridges other than service openings and penetrations by metal fasteners with a x-sectional area of less than 0.04% of the opaque surface area of the assembly.
int = Intermediate framing -- Includes insulated headers, corners and interior partition wall to exterior wall intersections. Refer to Section A103.2 for framing definitions.

Footnote Summary:

Each table in the 2012 WSEC has footnotes applicable to specific information provided in the table. This footnote summary provides only abbreviated details from these footnotes. ***Refer to 2012 WSEC for complete footnote information.***

1 - Assembly descriptions can be found in Chapter 2 and Appendix A.
2 - Use of assembly U-factors, C-factors and F-factors from Appendix A and Chapter 3 are required unless otherwise allowed by the provisions of this Code.
3 - For metal building roofs where using R-value compliance method, a thermal spacer block is required. Otherwise use the U-factor compliance method.
4 - Where heated slabs are below-grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
5 - Heated slab F-factors shall be determined specifically for heated slabs. Unheated slab F-factors shall not be used.
6 - Non-residential CMU walls may be eligible to use Table C402.1.2 U-factor if all provisions stated in applicable footnote are met. Refer to Footnote D in Table C402.1.2 or Footnote C in Table C402.2 for eligibility requirements.
7 - Roof, wall or floor assemblies required to have continuous insulation may be eligible for alternate continuous insulation R-values if all provisions in applicable footnote are met. Refer to Footnote F in Table C402.2 for eligibility requirements.

End of Envelope Requirements Summary

Prescriptive Path, pg. 1 — ENV-PRESCRIPTIVE

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised Oct 2013

Project Address `1 - Fill this line out on ENV-SUM`	Date
Occupancy Group ◯ Commercial ◯ Group R	For Building Department Use
Fenestration Area as % gross above-grade wall area — Max. Target:	
Skylight Area as % gross roof area — Max. Target:	
Vertical Fenestration Alternates: None Selected on ENV-SUM	

Prescriptive compliance of envelope assemblies may be accomplished by providing insulation R-values per Table C402.2 or U-factors/F-factors per Tables C-402.1.2 and C-402.3. A single project may comply via R-values for some envelope assemblies and U-factors/F-factors for others. Note compliance method taken for each assembly in spaces provided.

Building Component — Provide page/plan # of assembly detail and ID.			R-Value for Prescriptive Compliance			U-Factor/F-Factor for Alternative Prescriptive Compliance	
			Cavity Ins. R-Value	Continuous Ins. (CI) R-Value	Alternate CI R-Value (Table C402.2 Footnote F)[1]	Assembly U-Factor	U-Factor Source (Appendix A, Chapter 3 table, or approved calculation method)
Roofs	Deck	ID:					
		ID:					
		ID:					
	Mtl Bld[2]	ID:					
		ID:					
		ID:					
	Other	ID:					
		ID:					
		ID:					
Opaque Walls - Above	Mtl. Frm.	ID:					
		ID:					
		ID:					
	Mtl Bld.	ID:					
		ID:					
		ID:					
	Wood[3]	ID:					
		ID:					
		ID:					
	Mass[4]	ID:					
		ID:					
		ID:					
Below Grade Walls		ID:					
		ID:					
		ID:					
		ID:					
Floors	Mass	ID:					
		ID:					
		ID:					
	Framed[5]	ID:					
		ID:					
		ID:					
			Perim. Ins. R-Value	Full Slab CI R-Value		F-Factor	F-Factor Source
Slab-on-grade[6]	Unheated	ID:					
		ID:					
		ID:					
	Heated	ID:					
		ID:					
		ID:					

Note 1 *- Calculations are required. Ratio of cross-sectional area of metal penetration through otherwise continuous insulation shall be 0.04-0.08%.*
Note 2 *- Thermal spacer blocking and liner system are required for prescriptive R-Value compliance.*
Note 3 *- Intermediate framing is required for prescriptive R-Value compliance in wood-framed wall assemblies.*
Note 4 *- Proposed non-residential building CMU walls meeting Table C402.1.2 Footnote D requirements can enter the target U-value of 0.104.*
Note 5 *- Refer to Table C402.2, Footnote E for prescriptive R-Value requirement for steel floor joist assemblies.*
Note 6 *- Prescriptive slab-on-grade insulation shall extend from top of slab to minimum length per an approved method as defined in C402.2.6.*

Prescriptive Path, pg. 2 — ENV-PRESCRIPTIVE

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 — Revised Oct 2013

Project Address `1 - Fill this line out on ENV-SUM`	Date
Fenestration Area as % gross above-grade wall area — Max. Target:	For Building Department Use
Skylight Area as % gross roof area — Max. Target:	

Notes: 1: If vertical fenestration or skylight area exceeds maximum allowed per C402.3.1, then Target Area Adjustment of all applicable envelope elements will be calculated by the compliance form. Refer to Target Area Adjustment worksheet for this calculation.
2: Provide U-factor for the fenestration assembly, which is the combination of frame and glazing

Building Component — Provide page/plan # of assembly detail and ID.		R-Value for Prescriptive Compliance			U-Factor/F-Factor for Alternative Prescriptive Compliance	
		Cavity Ins. R-Value	Continuous Ins. (CI) R-Value	Alternate CI R-Value (Table C402.2 Footnote F)	Assembly U-Factor	U-Factor Source (Appendix A, Chapter 3 table, or approved calculation method)
Swing Doors	ID: ID: ID:					
Roll-up Doors	ID: ID: ID:					

			Solar Heat Gain Coefficient (SHGC)			U-Factor for Prescriptive Compliance	
			Projection factor (PF) (if applicable)	SHGC Adjustment Multiplier (if applicable)	Assembly SHGC	Assembly U-Factor	U-Factor Source (NFRC, Appendix A, or Chapter 3 table)
Vertical Fenestration	Non-Metal	ID: ID: ID: ID:					
	Metal, fixed	ID: ID: ID: ID:					
	Metal, op.	ID: ID: ID: ID:					
	Mtl entrance	ID: ID: ID: ID:					
Skylights	All Types	ID: ID: ID: ID:					

Note 1 - SHGC Adjustment Multiplier based on calculated Projection Factor. Refer to Equation C4-2 Projection Factor Calculation and Table C402.3.3.1 for corresponding SHGC Multiplier.

Refrigerated Spaces, Walk-in & Warehouse

Coolers	Notes	R-Values for Prescriptive Compliance	Prescriptive U-Factor not allowed.
Walls			
Ceiling			
Doors			
Freezers			
Walls			
Ceiling			
Doors			
Floor			

Component Performance Path, pg. 1 — ENV-UA

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised Oct 2013

Project Address 1 - Fill this line out on ENV-SUM	Date
Occupancy Group ◯ Commercial ◯ Group R	For Building Department Use
Change in occupancy or space conditioning ◯	
Note - Proposed UA may exceed Target UA by 10% per C101.4.4 and C101.4.5	
Fenestration Area as % gross above-grade wall area — Max. Target:	
Skylight Area as % gross roof area — Max. Target:	
Vertical Fenestration Alternates: None Selected on ENV-SUM	

Notes: 1: If vertical fenestration or skylight area exceeds maximum allowed per C402.3.1, then Target Area Adjustment of all applicable envelope elements will be calculated by the compliance form. Refer to Target Area Adjustments worksheet for this calculation.
2: U-factors shall come from Appendix A, Chapter C303, or calculated per approved method as specified in C402.1.2.

Building Component		Provide source of U-factor, page/plan # of assembly detail & ID	**Proposed UA** U-factor	x Area (A)	= UA (U x A)	**Target UA** U-factor	x Area (A) =	UA (U x A)
Roofs	Deck	R= ID:				set occ.		
		R= ID:				Above Deck Insulation		set occ.
		R= ID:						
	Mtl Bld	R= ID:				set occ.		
		R= ID:				Metal Building		set occ.
		R= ID:						
	Other	R= ID:				set occ.		
		R= ID:				Single raft, attic, other		set occ.
		R= ID:						
Opaque Walls - Above	Mtl. Frm.	R= ID:				set occ.		
		R= ID:				Steel/metal frame		set occ.
		R= ID:						
	Mtl Bld.	R= ID:				set occ.		
		R= ID:				Metal Building		set occ.
		R= ID:						
	Wood/Oth	R= ID:				set occ.		
		R= ID:				Wood Frame, other		set occ.
		R= ID:						
	Mass*	R= ID:				set occ.		
		R= ID:				Mass Wall		set occ.
		R= ID:						
Below Grade Walls		R= ID:				set occ.		
		R= ID:				Assumed to be Mass Wall		set occ.
		R= ID:						
		R= ID:						
Floors	Mass	R= ID:				set occ.		
		R= ID:				Mass Floor		set occ.
		R= ID:						
	Framed	R= ID:				set occ.		
		R= ID:				Joist/Framing		set occ.
		R= ID:						
			F-factor	x Perimeter	= UA(U x A)	F-factor	x Perimeter =	UA (U x A)
Slab-on-grade	Unheated	R= ID:				set occ.		
		R= ID:				Slab-On-Grade		set occ.
		R= ID:						
	Heated	R= ID:				set occ.		
		R= ID:				Heated Slab-On-Grade		set occ.
		R= ID:						
				Area	**UA**		**Area**	**UA**
		Page 1 Subtotal						

**Proposed non-residential CMU walls meeting Table C402.1.2 Footnote D requirements can use the target U-value of 0.104 rather than Appendix A values. Show footnote requirements in plans.*

Component Performance Compliance (UA) — **Occupancy Group not selected**

Component Performance Path, pg. 2 — ENV-UA

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 — Revised Oct 2013

Project Address	1 - Fill this line out on ENV-SUM	Date
Fenestration Area as % gross above-grade wall area	Max. Target:	For Building Department Use
Skylight Area as % gross roof area	Max. Target:	

Notes: 1: If vertical fenestration or skylight area exceeds maximum allowed per C402.3.1, then Target Area Adjustment of all applicable envelope elements will be calculated by the compliance form. Refer to Target Area Adjustments worksheet for this calculation.
2: Provide NFRC rated U-factor or default U-factor from Appendix A for the fenestration assembly thermal performance (combination of frame and glazing).
3: Fenestration that separates conditioned space from a non-conditioned or semi-conditioned

Building Component		Provide source of U-factor, page/plan # of assembly detail & ID	Proposed UA U-factor	x Area (A)	= UA (U x A)	Target UA U-factor	x Area (A) =	UA (U x A)
Swing Doors		U= ID: U= ID: U= ID:				set occ.		
						Opaque Swing Doors		set occ.
Roll-up Doors		U= ID: U= ID: U= ID:				set occ.		
						Opaque rollup & sliding		set occ.
Vertical Fenestration	Non-Metal	U= ID: U= ID: U= ID: U= ID:				set occ.		
						Non-Metal Frame		set occ.
	Metal, fixed	U= ID: U= ID: U= ID: U= ID:				set occ.		
						Metal Frame, Fixed		set occ.
	Metal, op.	U= ID: U= ID: U= ID: U= ID:				set occ.		
						Metal Frame, Operable		set occ.
	Mtl entrance	U= ID: U= ID: U= ID: U= ID:				set occ.		
						Metal Entrance Door		set occ.
Skylights	All Types	U= ID: U= ID: U= ID: U= ID:				set occ.		
						All types		set occ.

	Area	UA		Area	UA
Page 2 Subtotal					
Page 1 Subtotal					
Total					

To comply:
1) Proposed Total UA shall not exceed Target Total UA.
2) Proposed Total Area shall equal Target Total Area.

Component Performance Compliance (UA)

Occupancy Group not selected

Vertical Fenestration Target Area Adjustment Calculations

If vertical fenestration area exceeds maximum allowed per Section C402.3.1, then Target Area Adjustment of all applicable envelope elements is required. This worksheet automatically calculates these adjustments and updates target areas in the ENV-UA and ENV-SHGC worksheets. Information shown in this worksheet is for reference only and is write-protected. Submit this Target Area Adjustment form with ENV-UA and ENV-SHGC forms.

VF = Vertical fenestration
DR = Opaque doors
AG = Above-grade
NW = Net above grade wall (excludes fenestration and doors.)
Gross Exterior Above-Grade Wall Area= VF + NW + DR

Proposed Areas

Vertical Fenestration ->	VF=	
Opaque ->	NW=	DR=

Gross Exterior AG Wall Area		Max Vert. Fen. % (C402.3.1)		100	=	Maximum Target Vert. Fen. Area
	x		÷			

Total Vertical Fenestration		Maximum Target	=	Delta Vertical Fenestration	0 / ⇳ greater	=	Excess Vertical Fenestration
	–						

Total Vertical Fenestration		Excess Vertical Fenestration	=	Target Vertical Fenestration	÷	Total Vertical Fenestration	=	Target VF Multiplier
	–							

Multiplier applied to all Proposed Vertical Fenestration Areas to calculate Target Vertical Fenestration Area

Net AG Wall Area		Excess Fenestration	=	Target Net Wall Area	÷	Net Wall	=	Target Net Wall Mult.
	+							

Multiplier applied to all Proposed Opaque Above-Grade Wall Areas to calculate Target Above-

UA Adjustments

Vertical Fenestration	Proposed Area		Target VF Mult.	=	Target Area
Non-metal frame		x		=	
Metal frame, fixed		x		=	
Metal frame, operable		x		=	
Metal frame, entrance door		x		=	

Above-grade Wall	Proposed Area		Target Net Wall Mult.	=	Target Area
Steel Frame		x		=	
Metal Building				=	
Wood / Other frame		x		=	
Mass		x		=	

Sum of Proposed		**Sum of Target**	

Target areas in shaded boxes are applied to target areas on ENV-UA

Sum of target above-grade wall and vertical fenestration areas are calculated to equal the sum of proposed

SHGC x A Adjustments

Non-North Vertical Fenestration	Proposed Area		Target VF Mult.	=	Target Area
PF < 0.2		x		=	
0.2 ≤ PF < 0.5		x		=	
PF ≥ 0.5		x		=	
North Vertical Fenestration					
PF < 0.2		x		=	
0.2 ≤ PF < 0.5		x		=	
PF ≥ 0.5		x		=	

SHGC target areas in shaded boxes are applied to target areas on ENV-SHGC

Skylight Target Area Adjustment Calculations

If skylight area exceeds maximum allowed per Section C402.3.1, then Target Area Adjustment of all applicable envelope elements is required. This worksheet automatically calculates these adjustments and updates target areas in the ENV-UA and ENV-SHGC worksheets. Information shown in this

SKY= Skylight	**NR** - Net roof (excludes skylight)	**Gross Exterior Roof Area** = SKY + NR

Proposed Areas

Skylight (Horizontal Fenestration) -> SKY=

Opaque Roof -> NR=

Gross Exterior Roof Area		Max Skylight % (C402.3.1)		100	=	Maximum Skylight Fenestration Area
	x		÷		=	

Totãl Skylight Area		Maximum Target	=	Delta Skylight Area	0 / ⇳ greater	=	Excess Skylight
	–		=			=	

Total Skylight Area		Excess Skylight	=	Target Skylight Area	÷	Total Skylight Area	=	Target SL Multiplier	*Multiplier applied to all Proposed Skylight Areas to calculate Target Skylight Area*
	–		=		÷		=		

Net Roof Area		Excess Skylight	=	Target Net Roof Area	÷	Net Roof	=	Target Net Roof Mult.	*Multiplier applied to all Proposed Opaque Roof Areas to calculate Target*
	+		=		÷		=		

UA and SHGC x A Adjustments

	Proposed Area		Target SL Mult.		Target Area	*Target areas in shaded boxes are applied to target areas on ENV-UA*
Skylight						
All		x		=		
Roof	Proposed Area		Target Net Wall Mult.		Target Area	
Insulation Above Deck		x		=		
Metal Building		x				
Attic / All Others		x		=		
Sum of Proposed			**Sum of Target**			*Sum of target roof and skylight areas are calculated to equal the sum of proposed*

SHGC Calculation — ENV-SHGC

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 Revised Oct 2013

Project Address	1 - Fill this line out on ENV-SUM	Date
Fenestration Area as % gross above-grade wall area	Max. Target:	For Building Department Use
Skylight Area as % gross roof area	Max. Target:	
Vertical Fenestration Alternates:	None Selected on ENV-SUM	

Notes: 1 - Proposed vertical fenestration and skylight areas entered in ENV-SHGC must match proposed fenestration areas in ENV-UA.
2 - If Target Area Adjustment is required per ENV-UA, then target areas will be automatically adjusted in ENV-SHGC. Refer to Target Area Adjustments worksheet for this calculation.
3 - Provide NFRC rated SHGC or default from Table C303.1.3(3) for fenestration assembly SHGC.
4 - Fenestration that separates conditioned space from a non-conditioned or semi-conditioned space shall be included in this worksheet.

Skylights	**Proposed SHGC**			**Target SHGC**		
Provide source of SHGC, page/plan # of assembly detail & ID	SHGC	x Area (A)	= SHGC x A	SHGC	x Area (A) =	SHGC x A
ID:				set occ.		
ID:				SHGC		set occ.
ID:						
ID:						
ID:						
	Totals			**Totals**		

All Non-North Vertical Fenestration+		**Proposed SHGC**			**Target SHGC ++**			
Provide source of SHGC, page/plan # of assembly detail & ID	PF	SHGC*	x Area (A)	= SHGC x A	PF Category	SHGC	x Area (A) =	SHGC x A
ID:	0				PF < 0.2	set occ.		
ID:	0				0.2≤PF<0.5	set occ.		
ID:	0				PF ≥ 0.5	set occ.		
ID:	0				*++ If projection factor (PF) credits are applied to the proposed design, Target SHGC will sum fenestration area by PF category.*			
ID:	0							
ID:	0							
ID:	0							
ID:	0							
ID:	0							
ID:	0							
		Totals				**Totals**		

+ If projection factor credit is applied, then vertical fenestration must be entered in the correct table according to orientation. If credit is not applied then all vertical fenestration can be entered in either table.
** Note: Fenestration that separates conditioned space from a non-conditioned or semi-conditioned space shall be listed here with a proposed SHGC equal to the target value.*

North Vertical Fenestration+		**Proposed SHGC**			**Target SHGC++**			
Provide source of SHGC, page/plan # of assembly detail & ID	PF	SHGC*	x Area (A)	= SHGC x A	PF Category	SHGC	x Area (A) =	SHGC x A
ID:	0				PF < 0.2	set occ.		
ID:	0				0.2≤PF<0.5	set occ.		
ID:	0				PF ≥ 0.5	set occ.		
ID:	0				*++ If projection factor (PF) credits are applied to the proposed design, Target SHGC will sum fenestration area by PF category.*			
ID:	0							
ID:	0							
ID:	0							
ID:	0							
		North Total						

To comply, the Proposed total SHGC x A for all fenestration (vertical & skylights) shall not exceed the Target total SHGC x A.

	Area	**SHGC x A**		**Area**	**SHGC x A**
Grand Total			**Grand Total**		

Component Performance Compliance (SHGC)	Occupancy Group not selected

Building Permit Plans Checklist, pg. 1 ENV-CHK

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1

Project Address	1 - Fill this line out on ENV-SUM	Date

The following information is necessary to check a building permit application for compliance with the building envelope requirements in the Washington State Energy Code, Commercial Provisions.

Applicability (yes,no,na)	Code Section	Component	Compliance information required in permit documents	Location in Documents	Building Department Notes
SCOPE					
	C101.5.2	Low energy spaces	Low energy spaces identified on plans		
	C101.5.2.1 C402.1.4	Semi-heated spaces	Semi-heated spaces identified on plans		
	C402.5 C402.6	Cooler and freezer spaces	Walk-in and refrigerated warehouse cooler and freezer spaces identified on plans		
	C101.4.6	Mixed occupancy	Spaces with different occupancy requirements identified on plans		
	C101.4.4 C101.4.5	Change of occupancy/space conditioning	Existing F, S and U-occupancy building spaces undergoing a change of occupancy or space conditioning that require compliance are identified on plans		
ENVELOPE PROVISIONS					
	C303.1	Insulation identification	Indicate identification mark shall be applied to all insulation materials		
	C303.1.3 C402.4.3	Fenestration product rating	Fenestration products shall be labeled with rated U-factor, SHGC, VT, and leakage rating		
	C303.1.1 C402.2	General insulation installation	Indicate installation methods, thicknesses, densities and clearances to achieve the intended R-value of all insulation materials;		
			Where two or more layers of rigid insulation will be used, indicate that edge joints between layers are staggered		
	C402.2.1	Roof assembly insulation	Indicate R-value(s) of cavity/continuous insulation on roof sections;		
			Indicate framing materials on roof sections;		
			Indicate method of framing for ceilings below vented attics and vaulted ceilings per A102.2 (std, adv);		
			Provide area-weighted calculations for sloped insulation installed entirely above deck;		
			Indicate R-values for thermal spacers and each insulation layer, and liner system (LS) method for metal building roofs		
	C402.2.1	Skylight curb insulation	Indicate curb insulation R-value on roof section if not included in skylight NFRC rating		
	C402.2.3 C402.2.4 C303.2.1	Above/below grade wall insulation	Indicate R-value(s) of cavity/continuous insulation on wall sections;		
			Indicate framing materials on wall sections;		
			Indicate method of framing for wood const per A103.2 (std, int, adv);		
			Indicate mass of masonry walls;		
			Indicate loose-fill core insulation material, percentage of cores filled, and frequency of grouted cores and bond beams for masonry walls;		
			Indicate method of protection of exposed exterior basement/crawlspace wall insulation		
	C402.5 C402.6	Walk-in/refrigerated warehouse cooler and freezer insulation	Indicate insulation R-values of ceilings, walls, doors, floors on sections;		
			Indicate method of minimizing door infiltration;		
			Indicate type(s) of transparent doors and windows		
	C402.2.7	Opaque doors	Indicate rated U-factor (swinging) or R-value (roll-up/sliding) on wall sections - applies to doors with less than 50% glazed area		
	C402.2.5	Floor over outdoor or unconditioned space insulation	Indicate R-value(s) of cavity/continuous insulation on floor sections;		
			Indicate framing material on floor sections;		
			Indicate mass of masonry floors		
	C402.2.6 C303.2.1	Slab-on-grade floor insulation	Indicate R-value of continuous insulation on wall section or foundation detail;		
			Indicate insulation extends down vertically and/or horizontally the required distance from top of slab;		
			Indicate method of protection of exposed exterior slab edge insulation		
	C402.2.6 C303.2.1	Radiantly heated slab-on-grade floor insulation	Indicate R-value of continuous insulation on wall section or foundation detail;		
			Indicate insulation extends down vertically from top of slab and then horizontally under the entire slab;		
			Indicate method of protection of exposed exterior slab edge insulation		
	C402.2.8	Radiant heating system insulation	Indicate insulation R-value behind radiant panels, U-bend/headers and bottom surface of radiantly heated floors (other than radiantly heated slab-on-grade)		

Building Permit Plans Checklist, pg. 2 ENV-CHK

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1

Project Address	1 - Fill this line out on ENV-SUM			Date	
Applicability (yes,no,na)	Code Section	Component	Compliance information required in permit documents	Location in Documents	Building Department Notes
	C402.3.1	Vertical fenestration maximum area	Provide calculation for total vertical fenestration area as percentage of gross above grade wall area		
	C402.3.1.2	Skylight maximum area	Provide calculation for total skylight area as percentage of gross roof area		
	C402.3.3 C402.3.1.3 C303.1.3	U-factors, SHGC and VT for all fenestration assemblies	Indicate U-factors, SHGC and VT values in fenestration schedules;		
			An area-weighted U-value may be used for all fenestration elements that qualify within the same fenestration category per Table C402.3;		
			Indicate if values are NFRC or default. If default then specify frame type, glazing layers, gap width, low-e coatings, gas-fill.		
	C402.3.1.1 Chap. 2 Definition	Increased max. vertical fenestration area with daylighting controls	Provide calculations showing that percentage of overall conditioned floor area in the daylight zone is equal to or greater than 50%;		
			Indicate method of daylighting control in lighting equipment schedules;		
			Indicate VT of vertical fenestration is at least 1.1 times the rated SHGC		
	C402.3.1.2	Increased max. vertical fenestration area with high-performance glazing	Indicate high performance U-factors and SHGC values in fenestration schedules;		
			An area-weighted U-value may be used for all fenestration elements that qualify within the same fenestration category per this section		
	C402.3.3 C402.3.3.1	Permanent shading devices	Provide projection factor calculations (Equation C4-2) and associated SHGC multipliers for north and non-north orientations		
	C402.3.2	Single story spaces requiring skylights	Provide calculations for percentage of conditioned floor area located within a skylight daylight zone;		
			Provide calculations for percentage of skylight area to daylight zone under skylights, OR;		
			Provide calculations for percentage of overall skylight effective aperture (Equation C4-1);		
			Indicate haze factor of skylight glazing material or diffuser		
AIR LEAKAGE					
	C402.4.1.1 C402.4.2	Air barrier construction and sealing	Indicate location of continuous air barrier on plans and sections;		
			Provide details for all joints, transitions in materials, penetrations in air barrier and note method of sealing (caulked, gasketed, or other approved method)		
	C402.4.5.1	Stairway and shaft vents	Indicate locations of all stairway and shaft vents;		
			Provide leakage rating of motorized dampers in mechanical equipment schedules;		
			Indicate method of emergency operation - activation of fire alarm or interruption of power		
	C402.4.5.2	Outdoor air intakes, exhausts and relief openings	Indicate locations of all outside air intakes, exhausts and relief outlets, including those integral to mechanical equipment;		
			Provide in mechanical equipment schedules leakage rating of dampers, identify whether motorized or gravity, and note any exceptions taken		
	C402.4.8	Recessed lighting in building envelope	Indicate IC rating of fixtures in lighting equipment schedules;		
			Indicate method of sealing between light fixture housing and wall or ceiling		
	C402.4.6	Loading dock seals	Indicate weather seal at cargo and loading dock doors		
	C402.4.7	Vestibules	Indicate locations and dimensions of vestibules;		
			For unconditioned vestibules, indicate which envelope assembly (interior or exterior) complies with the requirements for a conditioned space		
	C402.4 - .1.2.3	Air barrier building test	Indicate air barrier test method in accordance with ASTM E779 or approved equivalent;		
			Include the following requirements in project documents: (1) air barrier test report shall be submitted to jurisdiction once test is completed; (2) if test results exceed 0.4 cfm/ft2 at 0.3 in. wg then visually inspect air barrier and seal noted sources of leakage; (3) submit a follow-up report to jurisdiction noting corrective measures taken		

If "no" is selected for any question, provide explanation:

End of Building Permit Plans Checklist